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ABSTRACT

This study focused on faculty and student attitudes toward the use of calculators in college accounting and business mathematics courses. Two different surveys were used; one was administered to thirty-five full-time and part-time faculty in the accounting and business mathematics areas at one college, while a second survey was administered to a random sample of 244 students. Responses from both the faculty and students indicated fairly consistent attitudes. A seemingly larger portion of students felt that calculators should be allowed unconditionally, while the faculty appeared to have some reservations on the use of calculators especially in classes of business mathematics. (DT)

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A SURVEY OF ATTITUDES ON THE USE OF CALCULATORS IN THE COLLEGE CLASSROOM

EDUCATIONAL POLICY SYSTEMS

by

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ABSTRACT

The study focused on the use of calculators in the college classroom and attempted to determine faculty attitudes and student attitudes on the use of calculators.

Responses received from faculty and students indicated fairly consistent attitudes on the use of calculators. A seemingly larger portion of students felt that calculators should be allowed unconditionally while faculty appeared to have some reservations on the use of calculators especially in classes of business mathematics.

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INTRODUCTION

Today, mini-electronic calculators are rapidly becoming a common household tool as well as an essential item which college students bring with them to college. Five years ago these calculators were practically nonexistant. Why, then, the great increase in the supply of these calculators? For one thing, the number of companies producing them has drastically increased in the past five years. Thus, mass production and competition have combined to drive the price down from the original three hundred and forty five dollar price which Sharp, Inc. advertised their calculator for back in the early part of nineteen seventy.

There seems to be no doubt that calculators facilitate routine mathematical calculations. But what about the skills that students should develop from specific courses in mathematics, and in particular business mathematics? Do calculators prevent students from developing these needed skills? Several contrasting positions have been taken on this question.

The first position appeared in Newsweek Magazine in December, 1973. It was reported that the use of calculators is being questioned since, as some educators claim, students develop an insensitivity to errors. Therefore, on certain campuses the use of calculators has been banned.

In a syndicated column appearing in several newspapers recently various points of view were expressed(Barnes, 1975):

> "I don't look upon it as a substitute for learning to compute with pencil, said E. Glenadine Gill, president of the National Council of Teachers of Mathematics and professor of mathematics education at the University of Texas at Austin. But I think it can enable students to solve problems that otherwise might be laborious or beyond their computational skills."

Professor James T. Fey, a mathematics professor at the University of Maryland feels that if you have to ban the calculator to teach a mathematics course then "what you are teaching is trivial'(Barnes, 1975)

Massachusetts Institute of Technology Physicist Alan Natapff says:

> "Computational speed is not worth one minute of a school's time. What is worth time is understanding the theory of mathematical principles."

A group of fifty-two percent of mathematics teachers polled in the October, 1974 issue of Mathematics Teacher magazine agreed that the energies of mathematics instruction must be concentrated in computational skills, since arithmatic computation test scores have been stedily decreasing (Barnes, 1975).

The mass availability of calculators has lead to another problem. Are students who do not possess a calculator at a disadvantage compared to those students who do possess a calculator? Research is scarce on this topic.

Dr. Russell Hardwick, UCLA freshman chemistry chairman, estimates that a student using a calculator has a ten minute advantage over a student with a slide rule and therefore has banned calculators from all tests. Dr. Hardwick stated, " I felt until all of our students could have access to calculators, none could."(Newsweek, 1973)

An administrator at Purdue University agrees that the calculator may give students an advantage, but then adds: "So do bicycles. Are you going to outlaw bicycles because not everyone can afford them?" (Newsweek, 1973)

Presently, Johnson & Wales College has not faced the problem of the use of calculators in the classroom. Each instructor has therefore adopted his own policy or has completely ignored any possible problem with respect to their use in the classroom.

The problem, therefore, is to determine faculty attitudes and student attitudes with respect to the use of the calculator in the classroom with the expectation of recommending a policy governing their use to the college administration and faculty.

PROCEDURE

Two surveys were employed, one which attempted to gather faculty attitudes on the use of calculators and one which attempted to gather student attitudes on the use of calculators. Both instruments are contained in the appendix.

The faculty survey attempted to answer the following questions:

(A) Should the use of calculators be governed by college policy, departmental policy or instructor policy;

(B) Whether calculators should be allowed only when each student has access to one;

(C) Should calculators not be allowed if some students do not have access to them;

(D) Should calculators be allowed only if a student has access to one or does not choose to utilize one;

(E) Are students who do not have access to a calculator at a disadvantage compared to students who have access to calculators;

(F) Do calculators aid students in business mathematics;

(G) Do calculators prevent students from developing needed mathematical computational skills;

(H) Should calculators be allowed in accounting courses;

(I) Should calculators be allowed in business mathematics courses;

(J) Should calculators be allowed in all courses;

(K) Should student opinion be solicited in order to make a fair appraisal of the situation prior to recommending a policy?

The student survey attempted to answer the following questions:

(A) The number of students who have used calculators in their course work;

(B) The number of students who have used calculators in business mathematics courses and accounting courses;

(C) Student attitudes on the use of calculators in business mathematics courses and accounting courses;

(D) Where calculators have benefitted the student the most;

(E) Students attitudes on whether calculators should be allowed in all courses;

(F) Students attitudes on whether calculators whould be allowed in accounting courses;

(G) Students attitudes on whether calculators should be allowed in business mathematics courses;

(H) Students attitudes on whether students should be allowed to use calculators despite the fact that some students do not have access to them.

(I) Do calculators aid students in business mathematics courses;

(J) Do calculators prevent students from developing needed mathematical skills?

The survey was administered to all full-time faculty and all part-time faculty in the accounting and business mathematics areas. The student survey was administered to a random sample of two hundred and forty-four full-time and part-time students.

DATA RESULTING FROM STUDY

The faculty survey was administered to thirty-five full-time and part-time faculty. Twenty-six surveys were returned for a response rate of seventy-four percent(75%).

When asked how the use of calculators should be governed the following responses were received:

(1) Individual instructor policy -16 (62%)

(2) Departmental policy -- 7 (27%)

(3) College policy - 3 (11%)

Faculty were asked when calculators should be allowed:

(1) Only when each student has access to one - 2 (8%)

(2) Only when each student has access to one or does not choose to utilize one - 11 (46%)

(3) Unconditionally, despite the fact that some students would like to utilize one but do not have access to one - 11 (46%)

The question was posed to faculty concerning the advantage of a calculator. Nineteen(73%) faculty members felt that a student without a calcualtor was at a disadvantage while seven (27%) felt a student was not at a disadvantage compared to those students who do have access to them.

When faculty members were asked how calculators affected performance in business mathematics the following responses were received:

(1) Fourteen (58%) felt that calculators aid students since routine computations are made more rapidly;

(2) Ten (42%) felt that calculators prevent a student from developing mathematical skills.

The survey also asked faculty their attitudes on the use of calculators in specific courses. The following responses were received:

(1) All courses.....14 (70%)

(2) All courses except business mathematics..... 5 (25%)

(3) All courses except accounting..... 0

(4) Should not be allowed in any course..... 1 (5%)

The final question posed to faculty concerned the solicitation of student opinion on the use of calculators in the college classroom. Eighteen(82%) faculty members felt that student attitudes should be solicited while four (18%) felt that student attitudes should not be solicited.

The student survey was administered to two hundred and fourty -four randomly selected full-time and part-time students. The initial question concerned the frequency of usage of calculators in accounting and business mathematics classes. One hundred and sixty-two students responded that they had used calculators in their course work, fourteen (5%) in business mathematics and one hundred and fifty-four(63%) in accounting classes. Eighty-two students responded that they had not used a calculator in their course work.

When students were asked their attitudes on the use of calculators in various courses they responded as follows:

(1) Calculators should be allowed in all courses.....165 (72%)

(2) Calculators should be allowed in all courses except business mathematics..... 47 (21%)

(3) Should be allowed in all courses except accounting..... 0

(4) Should not be allowed in any course.....16 (7%)

The question was posed to students concerning the advantage of a calculator. They responded:

(1) Students who do not possess a calculator are at a disadvantage compared to those students who possess a calculator.....154 (68%)

(2) Students who do not possess a calculator <u>are not</u> at a disadvantage compared to those students who possess a calculator..... 73 (32%)

Students were also asked when calculators should be allowed. Responses were as follows:

(1) Calculators should be allowed only when each student possesses one.....17 (7%)

(2) Calculators should be allowed only when each student either possesses one or does not choose to do so.....90 (39%)

(3) Calculators should be allowed despite the fact that some students who do not possess one would like to do so but are unable.....125 (54%)

The final question which students were asked to respond to concerned the use of calculators in business mathematics classes. One hundred and ninety students(78%) responded that calculators aid in routine computations and thus concepts are acquired with more ease. In contrast, fifty-three students(22%) felt that calculators prevent students from developing mathematical skills.

COMPARISON OF RESPONSES

Table I. on the following page summarizes responses received from students and faculty for questions which were alike on the two instruments administered.. For most questions faculty and student attitudes appear to be similiar. When faculty and student responses concerning the use of calculators in business mathematics classes are compared we note a difference of opinion. More students (78%) feel that calculators do not impede a student from acquiring needed skills while faculty (58%) feel that calculators aid students in acquiring needed skills.

TABLE I.

COMPARISON OF FACULTY AND STUDENT RESPONSES

QUESTIONS	RESPONSES			
	FACULTY		STUDENT	
	NO.	%	NO.	%
Do you feel calculators should be allowed:				
A. in all courses	14	70%	165	72%
B. in all courses except business mathematics	5	25%	47	21%
C. in all courses except accounting	0	0	0	0
D. should not be allowed in any courses	1	5%	16	7%
Are students who do not possess a a calculator at a disadvantage compared to those who have them..				
YES	19	73%	154	68%
NO	7	27%	73	32%
Calculators should be allowed:				
A. only when each student possesses one	2	8%	17	7%
B. only when each student either possesses one or does not choose to do so	11	46%	90	39%
C. despite the fact that some students lack the means of acquiring one	11	46%	125	54%
Calculators and business mathematics:				
A. calculators aid students since routine computations are made more rapidly and thus the students may acquire the concepts with more ease	14	58%	191	78%
B. calculators prevent students from developing mathematical skills	10	42%	53	22%

RECOMMENDATIONS

Responses from faculty and students indicate fairly consistent attitudes on the use of calculators in the classroom. Based on the responses received from the surveys the following course of action is recommended:

(1) The use of calculators in the classroom should be governed by individual instructor policy until further study indicates a need for a change in this approach. Although each instructor should decide his own policy he should be urged to consider all of the relevant research and facts prior to formulating any such policy.

(2) The establishment of a committee to further investigate the use of calculators in the classroom. This committee should consist of one member of each of the academic departments, i.e., Accounting, Business Administration, Data Processing, Humanities and Secretarial Science.

The committee should be charged with the task of:

(A) Deciding whether calculators aid or impede students in business mathematics;

(B) resolving the problem caused by some students having a possible advantage over other students by the mere possession of a calculator when other students do not have access to a calculator.

SELECTED REFERENCES

Barnes, Bart. " Calculators or Brains in the Schools?" The Providence Sunday Journal , January 12, 1975.

Denman, Theresa. "Calculators in Class" Instructor , February, 1974.

Newsweek Magazine December 17, 1973, "Tool or Crutch?".

FACULTY QUESTIONNAIRE

1. Do you feel that the use of calculators should be governed by:

   individual instructor policy _____
   department policy _____
   college policy _____

2. Do you feel that calculators:

   A. should be allowed in all courses _____
   B. should be allowed in all courses except Business Math _____
   C. should be allowed in all courses except Introductory Accounting _____

3. Are students who do not possess a calculator at a disadvantage compared to those who own calculators? Yes _____ No _____

4. Check which policy best pertains to your thoughts on the use of calculators:

   A. should be allowed only when each student possesses a calculator _____
   B. should be allowed only when each student either owns a calculator or does not choose to own one _____
   C. should be allowed despite the fact that some students who do not own a calculator would like to but do not have the means to do so _____

5. Calculators and Business Mathematics (Check all which apply)

   A. calculators aid students since routine computations are made rapidly and thus the students may acquire the concepts with more ease _____
   B. calculators prevent students from developing their mathematical skills _____

6. Should student be allowed to express their viewpoint prior to formulating any policy with respect to calculators?

   Yes _____ No _____

7. What are your general feelings on the use of calculators in the classroom?

8. Area of specialization:

   _____ Accounting/Business Math
   _____ Business Administration (Economics, Management, Marketing, etc.)
   _____ Humanities
   _____ Social Sciences
   _____ Data Processing
   _____ Secretarial

STUDENT SURVEY

1. Have you used a calculator in your course work: yes _____ no _____

2. Check the following courses in which you have used a calculator:

   Business Math _____ Accounting 300 _____ Accounting 301 _____

3. Do you feel calculators:

   A. should be allowed in all courses _____
   B. should be allowed in all courses except Business Math _____
   C. should be allowed in all courses except Accounting 300 _____
   D. should be allowed in all courses except Accounting 300 and 301 _____
   E. should not be allowed in any course _____

4. Of the courses in which you have used a calculator, where did the calculator benefit you? (Check all which apply)

   Business Math _____ Accounting _____

5. Are students who do not possess a calculator at a disadvantage compared to those who own calculators? yes _____ no _____

6. Check which policy best pertains to your thoughts on the use of calculators:

   A. should be allowed only when each student possesses a calculator _____
   B. should be allowed only when each student either owns a calculator or does not choose to own one _____
   C. should be allowed despite the fact that some students who do not own a calculator would like to but do not have the means to do so _____

7. Calculators and Business Mathematics (Check all which apply)

   A. calculators aid students since routine computations are made rapidly and thus the students may acquire the concepts with more ease _____
   B. calculators prevent students from developing their mathematical skills _____

8. What are your general feelings on the use of calculators in the classroom? (Use back of page for response)

9. Student Information: Major _____ Year _____

   Have you taken Business Math: Yes _____ No _____

   Have you taken Accounting 300: Yes _____ No _____

   Have you taken Accounting 301: Yes _____ No _____